Abstract of the Disclosure

An apparatus for the cleaning of flue gases containing ash and sulfur dioxide produced by burning sulfur-containing coal in the combustion chamber of a circulating fluidized-bed firing system includes a system for delivering a particulate SO_2 sorbent into the combustion chamber. A feed system feeds a mixture of the ash, the SO_2 sorbent/SO_2 reaction product, and unreacted SO_2 sorbent from the combustion chamber to a mixing unit. A liquid supply system supplies water or an aqueous sodium-containing solution to the mixing unit, whereby the unreacted SO_2 sorbent is converted into a hydration product. A discharge system returns the ash, the reaction product, and the hydration product from the mixing unit into the combustion chamber, where the hydration product is reactivated into an SO_2 sorbent at a combustion temperature of 700° to 950° C.